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(54) Title: SYSTEM AND METHODS FOR NUCLEIC ACID AND POLYPEPTIDE SELECTION

(57) Abstract: This invention relates generally to systems and methods for identifying and selecting, desired proteins or nucleic acid molecules by linking mRNA, with known or unknown sequences, to its translated protein to form a cognate pair. The cognate pair is selected based upon desired properties of the protein or the nucleic acid. This method also includes the evolution of a desired protein or nucleic acid molecule by amplifying the nucleic acid portion of the selected cognate pair, introducing variation into the nucleic acid, translating the nucleic acid, attaching the nucleic acid to its protein to form a second cognate pair, and re-selecting this cognate pair based upon desired properties. Modified mRNAs operable to crosslink to tRNAs are also provided. Methods of producing a psoralen monoadduct or a crosslink are also provided. Methods of producing mRNA libraries and vaccines are also provided.